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a median sulcus; eyes nearly elliptical; ocelli about 55, in 8 series; segments 46; first segment semicircular, not striate; anal spine stout, projecting beyond the valves; length 25 mm. *Hab.* Fort Snelling, Minn. (W. D. Howe.)

9. *Iulus burkei* n. sp.—Rather stout; brown, with a series of dark dots on each side; vertex with a median sulcus; eyes triangular; ocelli 17, indistinct, in 4 series; segments 45–47; first segment produced forward to the eyes, not striate; last segment rounded; anal valves marginate; length 14 mm. *Hab.* Ukiah, Cal. (J. K. Burke.)

10. *Fontaria virginiensis brunnea* n. var.—This new variety can be easily distinguished from *virginiensis* by its color and form of last segment. Chestnut-brown, lateral plates and under parts yellow, a black, median dorsal line; last segment very blunt, sparsely pilose.—*Charles H. Bollman, Indiana University, Nov.* 27, 1886.

Mimicry in a Caterpillar.—S. E. Peal, writing from Assam to *Nature*, notices a singular case of mimicry on the part of a caterpillar, which, when suddenly surprised, erects its head in an attitude that caused the writer to mistake it for a shrew, probably the very animal that preys upon it. The resemblance is caused by two lateral prolongations and a pointed tip to the head; these when lifted in the peculiar attitude assumed simulate ears and a long muzzle, while the mouth parts in profile look like the mouth of a vertebrate.

The same writer states that the tiger causes the Sambur deer to run to it by uttering a whistle which only an expert can tell from that of the deer. The eye and nose lumps of a crocodile are so like lumps of foam that Mr. Peal confesses he has been deceived until he saw the supposed foam sink. He believes this simulation useful to the crocodile in obtaining its food.

A female chimpanzee in the Bidel menagerie, now at Paris, has been seen to weep as the climax of her grief when deprived of a child playmate.

ZOOLOGY.

A. S. Packard on the Cave Fauna of North America, with Remarks on the Anatomy and Origin of Blind Forms.[1]—The author briefly describes some of the larger caves, with notes on their hydrography, temperature, origin, and geological age, the food-supply of the inhabitants, the means of entering or colonizing the cavern, and lists of each cave fauna. These notes are followed by a systematic description of the animals and their geographical distribution. A comparative list of American and European cave animals shows that in America there are about sixty-two species to about one hundred and seventy-five in

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[1] Abstract of a paper read before the National Academy of Sciences, November, 1886.

Europe, though ninety of the latter belong to the genera Adelops and Anophthalmus. A preliminary list of blind non-cavernicolous animals, including deep-sea forms, enumerates less than two hundred species. Under the head of Anatomy of Blind Cave Arthropoda, the following changes in the eyes, optic ganglia, and optic nerves occur in forms living in total darkness: (1) Total atrophy of the optic ganglia and optic nerves, with or without the persistençe in part of the pigment (or retina), and the crystalline lens (Cecidotæa, Crangonyx, Adelops, and Pseudotremia). (2) Persistence of the optic lobes and optic nerves, but total atrophy of the rods and cones, retina and facets (*Orconectes pellucidus* and *hamulatus*). (3) Total atrophy of the optic ganglia, optic nerves, and all the optic elements, including rods and cones, retina and facets (Anophthalmus, Scoterpes, and (?) Anthrobia).

It was shown that the blind cave fauna as a whole must have originated from animals living in the upper world at the mouth of the caves or their vicinity. It was shown that there is a more or less exact parallelism between blind cave animals and blind or eyeless deep-sea forms, and the abyssal blind species of the Swiss lakes, as recently proved by the researches of naturalists; the abyssal marine as well as lake species are probably the descendants of immigrants from the well-lighted waters of moderate depths which have become adapted to their abnormal abyssal surroundings. In respect to color as well as loss of visual organs, and often in the elongation of appendages, certain deep-sea forms, at least, appear to resemble many cave forms, the increased tactile sense compensating for the loss of the power of sight. From what is known of the habits of blind or eyeless animals, whether living in caves, in the sea, or in lakes, or in the upper world in the soil or under stones, all are modified in much the same manner, and this is due to similar causes, the most prominent being the absence of light.

Notes on the Distribution of Shells.—From 1880 to the present year I have often collected shells about Eureka Springs, in Carroll County, Arkansas, and in the Kansas City *Review of Science* for 1883 I published a list of forty-two species, not including the Unionidæ, found in that county. Last March—15th to 27th—I made a trip through a number of the counties of Arkansas, commencing with Carroll and extending from there along the western line of the State, Benton and Washington being north of the mountains, Crawford south of them but on the north side of the Arkansas River, and Sebastian on the south side of it. Hot Springs is in Garland County, Hot Springs County south of it, and Jackson County north of Little Rock, on the Iron Mountain Railroad. The following list gives the result of a large amount of searching, though the total time given to it in Carroll County was many times that in any of the other counties.

Mesodon. In Carroll County I have gathered six species of this sub-genus, but not more than two in any of the other counties. Of *albolabris* I got many in Carroll County, most of them of a large size, though on the higher grounds a small variety was found, and also a variety named *alleni* by Professor Wetherby. In Garland County I got a couple of shells of somewhat smaller size than the largest from Carroll County, and darker color. Of *exoleta* I found a small size in Carroll County. For some time after the lip is fully formed the shell is thin, and has no parietal tooth, but it afterwards thickens, and a rather heavy tooth appears. In Washington County I found a single specimen, which was only 19–15 mm. diameter. Of *thyroides*, the same statement in regard to thickness and parietal teeth as in the last is true. This species was originally described as of 22–19½ mm. diameters, but I have it from Indiana 28–23 mm., and from Ohio and Missouri nearly as large. From Carroll County the shells were 22–19 mm., and these have been identified as *bucculentus*, though this is the typical size of *thyroides*. Two shells from Sebastian County were of the same size, and, though apparently mature, they had no parietal tooth. From Jackson County they were larger, being 24–20 mm., and from Benton County were the smallest I have yet seen,—18–15 mm,—one having a parietal tooth, and three others having none; these latter can scarcely be distinguished from *clausus* except by the height. The rare *divestus* was not uncommon in Carroll County; the size, 18–15 mm. From Franklin and Garland Counties they were nearly as large, while from Benton they were only 15–13 mm. I found *elevatus* in Carroll and Jackson Counties, and *clausus* in Carroll only.

Patula perspectiva Say. In abundance in Carroll County; a single one found in Benton County.

Patula alternata Say. In Carroll County it does not differ much from the northern specimens, but in Washington and Garland Counties it is much heavier ribbed, and has darker spots.

Stenotrema leaii Ward. In Carroll, Benton, and Washington Counties.

Stenotrema labrosa Bld. In considerable abundance in Carroll County; also found in Washington, Crawford, and Garland.

Triodopsis inflecta Say. In Carroll County, of light color and 11–10 mm. diameter. Similar but darker colored ones from Benton, Washington, and Franklin Counties. In Garland and Hot Springs Counties each I found one, 12–10 mm. diameters, but looking much larger on account of their height. From Jackson County I have one, 14–11 mm. and elevated, though others from the same place are of the ordinary shape and only 10–9 mm. diameters.

Triodopsis appressa Say. From the bluffs of the White River, in Carroll County; these shells are thin and of a very light horn color, with no indication of tooth on the peristome, even on the basal side, and with striæ very fine, so that the shell is somewhat glabrous. Largest, 21½–18 mm., and of nearly six whorls. On the bluffs of the Arkansas River, in Crawford County, the same variety is found, the largest observed being 19–16 mm. From Jackson County the shells are much more elevated, of a reddish horn color, with strong, rib-like striæ, and with tooth on basal side of the peristome more pronounced than in the typical shell, and with peristome heavier and more reflected. Size, 19–16½ mm., and five whorls.

Polygyra jacksoni Bland. This rare shell was found in Carroll County in considerable abundance among the gravel and small stones on the hillsides, and rarely under large stones; the size was typical, the largest being about 7 mm. diameter. In Washington County it was about the same size, but on the bluffs of the Arkansas River, in Crawford County, they were much larger, the largest being 8–7 mm. and the smallest 8–7 mm. diameter. They were plenty, and found under large stones. In Sebastian County they were nearly as large.

Polygyra dorfinelliana var. *sampsoni* Wetherby. In Carroll County I have gathered this shell in large numbers, sometimes getting fifteen or twenty under a single stone. They varied in size from 10½–8¾ mm. to 7–6¼ mm. diameter. In Benton and Washington Counties I found a few, and in Crawford County, where the *jacksoni* were of such large size, I got a single one, and it was 8–7 mm. diameter.

Polygyra leporina Gld. In Sebastian County, where I found three specimens of this and of two other species of *Polygyra*.

Bulimulus dealbatus Say. In Carroll and Crawford Counties.

Zonites. Of *arboreus* I got specimens in Carroll, Garland, and Hot Springs Counties; of *indentatus*, in Carroll and Benton Counties; of *friabilis*, in Carroll and Garland Counties; of *demissus*, in Garland County; of *gularis*, in Hot Springs County; and of *ligera*, in Jackson County.

Pupa. I found *fallax*, *armifera*, and *contracta* in Carroll, and the latter in Benton County.

In addition to the foregoing, the following land shells occur in Carroll County: *Patula solitaria* Say; *Triodopsis fallax* Say, variety *minor*; *Strobila labyrinthica* Say; *Macrocyclis concava* Say; *Succinea ovalis* Gld.; *S. verrilli* Bld. (?); *Helicina orbiculata* Say; *Pomatiopsis lapidaria* Say; *Tebenophorus carolinensis* Bosc; and *Limax campestris* Binn.

Of fresh-water shells, I found an abundance of some species, especially in Carroll County. Mr. C. F. Ancey, of France, has described *Physa albofilata* from Eureka Springs. I gathered the same species in Washington County. *Physa heterostropha* and *P. gyrina* were found in Carroll, and the latter in Benton, Washington, and Hot Springs Counties. *Limnæa humilis* was found in Carroll County and *L. columella* in Washington and Hot

Springs Counties; *Planorbis trivolvis* in Carroll and Washington Counties; and *P. bicarinatus* in Carroll and Hot Springs Counties; *Ancylus tardus* in Carroll, Benton, and Washington Counties; *Campolema ponderosa* Say, in Jackson County, *coarctata* Lea, in Carroll and Hot Springs Counties; *Sphærium transversum* and *Pisidium* (?) in Carroll County.

Pleurocera subulare Lea. In White River and King's River, in Carroll County, the latter being much the larger. Two or three species from Ouchita River, Hot Springs County, not yet identified.

Goniobasis. Specimens of what have been identified as *pallidula* were very plenty in White and King's River, in Carroll County, and what have been identified as *saffordi* in Washington and Hot Springs Counties.

I have some Unionidæ from three counties, but will not attempt now to make a list of what may be found in the State.—*F. A. Sampson, Sedalia, Mo.*

The Characteristics and Relations of the Ribbon-Fishes.—I have been very much interested in the monograph by T. Jeffery Parker "On the Skeleton of Regalecus argenteus" published in *T. Z. S.* (xii. pt. 1). For some years I have mentally set apart the genera *Regalecus* and *Trachypterus* (which I consider to represent distinct families) as a suborder of Teleocephali, and indicated it in 1885, under the name Tæniosomi, in the Standard Natural History (iii. 265), although I could only give external features. Parker's memoir shows that the type is characterized by the basis cranii being simple (there being no basisphenoid), post-temporal not bifurcate, hypercoracoid or scapular foramen marginal, and between the hypercoracoid and hypocoracoid, superior pharyngeals 4, subvertical, none greatly developed, and dorsal rays inarticulate. These characters thus contrast with all other subordinal divisions of the Teleocephali. In addition, the branchihyal apparatus is distinguished by the intercalation of persistent cartilaginous elements, so that Parker recognizes eight pieces in the copula instead of the normal four: "parabranchial" elements (to use Parker's term) are superadded to the first and second epipharyngeals, and the fifth arch has reverted to the original type, and lost its specialization as dentigerous pharyngeal bones. In fact, the segregation of the Trachypteridæ and Regalecidæ from the other fishes into an independent suborder seems well merited. I doubt very much whether the Stylephoridæ belongs anywhere near the group; it is a pity the genus cannot be re-examined. Another point has occurred to me. I am half inclined to think that the Heterosomatous fishes may have branched off from the original stock, or progenitors of the Tæniosomous fishes. I shall investigate the subject when I can get the requisite material.—*Theo. Gill.*

The Hyoid Structure in the Amblystomid Salamanders.—My attention was recently called by my friend Dr. Eleanor Galt to the fact that the figures of the hyoid apparatus of *Amblystoma punctatum* given by Drs. Parker and Wiedersheim are not correct. The latter ("Das Kopfskellet der Urodelen," pl. v. f. 75) represents the hypohyal cartilages as forming the posterior parts of a cartilaginous circle, from which two recurved processes on each side extend, the anterior approaching the ceratohyal, the posterior returning towards the basibranchial. Parker omits the annulus altogether. Now, as Dr. Galt points out, there is a cartilaginous ring which supports the circumference of the tongue in this genus in a manner different from anything known in any other genus of Batrachia. But it is not connected in any way with the hypohyals, but issues from each side of the basibranchial, posterior to them, and supports the tongue above the basibranchial level. It sends out one lateral process on each side (Fig. 1) which does not connect with the ceratohyals.

On examining other species of Amblystomidæ, Dr. Galt found the same character present in *A. talpoideum*, *A. opacum*, *A. tigrinum*, and *A. macrodactylum*. In *A. tenebrosum* she found a very different structure. There is no annulus, but its basal part remains in the form of a plate on each side of the middle line, the external angle of which represents the external process of the ring of *Amblystoma punctatum*. To the straight anterior border of this cartilage is attached a sheet of fibrous tissue, the fibres being distinctly antero-posterior in direction, and forming the basement tissue of the tongue. The cartilage, handle-like in this species, and ring-like in the *A. punctatum*, is not homologous with any of those which have received names, so I propose to call it the otoglossal cartilage.

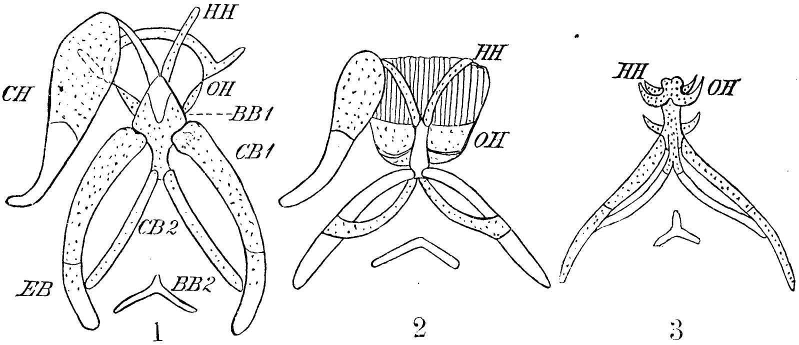

Fig. 1, *Amblystoma punctatum* × 2, from below. Fig. 2, *Chondrotus tenebrosus* $\frac{1}{1}$, from below. Fig. 3, *Linguælapsus annulatus*, × 2, from above. CH, Ceratohyal; HH, hyphohyal; OH, otohyal; BB1, first basi-branchial; BB2, second basibranchial; CB1, first cerato-branchial; CB2, second cerato-branchial; EB, epibranchial.

These observations of Dr. Galt induced me to examine some of the other species referred to Amblystoma, and I report the following results. The following species have the otoglossal cartilage essentially like that of *A. tenebrosum: A. aterrimum*, *A. paroticum*, *A. decorticatum*, and *A. microstomum*. As the type is so entirely different from that of Amblystoma proper, I propose to separate these species under the distinct generic name Chondrotus, with *C. tenebrosus* as the type. Examination of the species recently described as *A. annulatum* and *A. lepturum*,[1] shows that they represent a third genus quite distinct from either of the preceding. Here the otoglossal cartilage (Fig. 3) has somewhat the form of the basal part of that of Chondrotus, but it is entirely free from the basibranchial bone, sliding on it in obedience to the contractions of the pubohyal and genioglossal muscles. This genus I propose to call *Linguælapsus*. I know but two species of it.

According to the figures given by Wiedersheim (*l. c.*), Hynobius and Ranidens do not possess an otoglossal cartilage, agreeing in this respect with the Plethodontidæ. Wiedersheim also shows that the second epibranchial is distinct in these genera, and that the stapes is connected with the quadrate cartilage as in Cryptobranchus. I therefore think that the Hynobiidæ may be retained as distinct from the Amblystomidæ. How many genera it embraces is as yet uncertain.—*E. D. Cope.*

Color of the Eyes as a Sexual Characteristic in Cistudo carolina.—Naturalists interested in our native land-tortoise must often have noticed the bright-red eyes in some individuals. I have seen them so vivid in color as to attract the attention before any other character. In other tortoises of this species the eyes are brown and sometimes gray, so that from bright red through the browns to gray may be considered the extent of color variation.

Some time ago I commenced taking notes as to sex and color of the iris in all the specimens of *Cistudo carolina* met with, and found that the males had red eyes, while those of the opposite sex were for the most part brown or gray. The following were the colors assigned to the eyes, as I observed them at the time of finding the tortoises, and though I have used the word "scarlet" twice, perhaps very bright red would be more correct, though I will leave the characters as originally noted.

Staten Island,	July,	1885.	Full-grown specimen,	male,	eyes bright red.
“	“	“	“ “	“	“ scarlet.
“	“	“	“ “	female,	eyes reddish brown.
“	“	“	“ “	“	“ brown.
“	“	“	One-fourth grown specimen,	female (?),	eyes brown.
“	Aug.,	“	Full-grown specimen,	female,	eyes reddish brown.
New Jersey,	Sept.,	“	“ “	male,	“ red.
“	July,	1886.	“ “	female,	“ dark gray.
Staten Island,	June,	“	“ “	“	“ “
“	Oct.,	“	“ “	male,	“ scarlet.

I believe these tortoises have a particular fondness for certain locations, for on Staten Island I know of two places where they are particularly numerous, though they occur sparingly over the entire island. These favorite haunts are some twelve miles apart, and differ considerably as to the character of the soil, one being sandy, while the other is a rich wood loam. They present some characters in common, however, for in both the trees are small, with many open, grassy spots, and there are also some permanent wet places. These tortoises require water just as much as common rabbits do, and people who keep them captive in their cellars without giving them any, because they found them on the hill-top, subject them to a needless torture. If water is given them, they will quickly stick their heads into it, and then hold them upright as birds do when drinking.

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[1] Cope, Proc. Amer. Philosoph. Soc., 1886, p. 524.

In autumn they do not always dig under the soil to pass the winter in this locality, but will hibernate in a hollow or any place where a thick mass of leaves has collected. I found one on the 8th of February, 1885, in such a location, with but few leaves for a covering.—*William T. Davis.*

On the Morphogeny of the Carapace of the Testudinata.—Preliminary to a more extended paper on the group Athecæ of the Testudinata, allow me to give the following results, which seem to be of considerable interest:

The Dermatochelydæ (Sphagididæ) are characterized by the development of *independent* superficial dermal bones. In *Dermatochelys coriacea* and the allied extinct forms we find a pavement of small osseous plates extending over the whole shield, jointed to each other by more or less fine sutures. The number of these plates is very much larger than that of the other Testudinata, which never have more than seventy.

In all other Testudinata we find the carapace connected with the internal skeleton. That the carapace of the Dermatochelydæ is homologous to the carapace, without internal skeleton, of the rest of the Testudinata, there is no doubt; that the carapace of the "Thecophora" (Dollo) has developed from the carapace of the "Athecæ" is proved by a specimen of *Eretmochelys imbricata.* In this specimen I find small polygonal plates of the same shape as those of Dermatochelys suturally connected with the third, fourth, fifth, and sixth costal plates.

A form between the Dermatochelydæ and "Thecophora" (Dollo) is represented by the oldest known turtle *Psephoderma alpinum* H. v. Meyer, from the Triassic of the Bavarian mountains, preserved in Munich. In this highly-interesting specimen, never mentioned in monographs on the Testudinata, we have certainly not less than one hundred and ninety-three plates suturally united.[1]—*Dr. G. Baur, Yale College Museum, New Haven, Conn., October* 6, 1886.

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[1] It is important to mention that Dermatochelys has the nuchal plate developed besides the mosaic-like carapace. According to Gervais, this plate is covered by

Collections of Humming-Birds.—Hans von Berlepsch has some critical remarks on the humming-bird literature in the "Festschrift of the Cassel Vereins für Naturkunde," 1886. According to this, the largest collection of humming-birds was that of the late John Gould, which is now in the possession of the British Museum. It contained 5378 specimens, representing about 400 species. For second and third places there is a rivalry between Godman and Salvin, of London, on the one hand, and D. G. Elliot, of New Brighton, N. Y. The latter had, in 1878, 380 of the 426 known species, including many of the types of Bourcier, and many of which but a single specimen is known. Salvin and Godman's collection will shortly pass into the possession of the British Museum. Berlepsch himself has the fourth collection in size (about 2000 specimens and 350 species), and close to this is that of George N. Lawrence, of New York, which is especially rich in types.

The Nesting of Collyrio ludovicianus (Baird).—On the 10th of May, 1883, I found, in Williamstown, Mass., a nest of the Loggerhead Shrike, *Collyrio ludovicianus* (Baird). The nest was situated in a sheep-pasture, in a wild-thorn tree, at a distance of seven or eight feet from the ground, and was made from weeds, twigs, and wool, lined with hair and wool. The eggs, six in number, are a greenish-white tint, thickly marked and dotted with light brown and buff-purple spots, which on some of the eggs nearly cover the larger end. A few days later, perhaps a quarter of a mile from the first nest, a second was found, that had evidently been deserted. It contained two eggs similar to those of the former nest, and the construction and materials of the two nests were alike. Mr. H. A. Purdie, hearing of the circumstances, wrote on the 17th of May, 1883, that it was the first known instance of this bird breeding in Massachusetts. So far as I know, nothing was seen of this species in this vicinity until this spring, when I discovered a nest in an elm, perhaps ten feet from the ground, among the branches fringing the huge trunk; the nest was built of materials similar to those composing the nests found in 1883, and the bird was identified. As the last nest was within one hundred and fifty feet of the first, and all three so comparatively near, it is possible that the same pair return from year to year. At any rate, as the first recorded instance of the nesting of this species in Massachusetts, it may be of interest to ornithologists.—*Sanborn Gove Tenney, Williamstown, Mass., Nov. 27,* 1886.

Zoological News.—ECHINODERMS.—Hjalmar Theel, in his report upon the Holothuroidea of the "Challenger" Expedition, not

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the carapace. If this statement is correct, we cannot consider the nuchal plate as a part of the dermal skeleton. But the question is, What is the nature of this element? It is possible that it contains the ribs of the last cervical vertebra, with which it is connected.

only describes the new species of the groups Apoda and Pedata, but adds a series of short accounts of all the forms known. Up to 1872 very few forms were known from beyond one hundred, and scarcely any from beyond two hundred fathoms. Now we know of a number met with at five hundred fathoms, and some that are abyssal. Thus *Cucumaria abyssorum* occurs from fifteen hundred to two thousand two hundred and twenty-three fathoms, *Synapta abyssorum* at two thousand three hundred and fifty fathoms, *Pseudostichopus villosus* from thirteen hundred and seventy-five to two thousand two hundred, while *Holothuria thomsoni* has been dredged from depths ranging from eighteen hundred and seventy-five to two thousand nine hundred fathoms. Some species have a wide bathymetrical distribution, individuals residing at depths of from five hundred to seven hundred fathoms presenting no notable differences from others living near the shore.

M. H. Koehler maintains that in the Ophiuridæ the madreporic gland communicates by a canal with the lower or vascular peribuccal ring, much as in the Echini. The internal epithelium of the intestine of the Ophiuridæ is very thick.

M. Gauthier maintains that the plates of the apical region of echinids cannot be depended upon as characters for the delimitation of genera and species. He gives numerous figures of the variations in the apical plates of Hemiaster, from his own observations with the microscope, to prove this. The disposition of these plates, notably that of the madreporic plate, often exhibit the variations relied on to establish species and genera.

VERMES.—*Fecampia erythrocephala* is a parasite in several Decapoda, and has been studied by M. Giard. *Carcinas mænas* is most commonly infested with it when young. It lives in the body cavity, and is often bent into a U form. Some crabs have several parasites. Sometimes it is hidden in the liver. It is 15 to 18 mm. long, with a red head, and white, slightly rose-tinted cylindrical body. When sexually mature it leaves its host, crawls on the rocks, usually on its side, and soon builds a cocoon from threads secreted by the cutaneous glands. The cocoon is most dense upon the inside, becomes brittle by contact with the sea-water, and communicates by a narrow opening with the surrounding medium. Within the posterior part of the cocoon the parasite deposits its rose-tinted eggs enveloped in a gelatinous substance. The Fecampia itself has lost much of its bulk, and the snowy tint has disappeared. This transformation takes place at the end of August, at which period the females of *C. mænas* lay their eggs.

TUNICATES.—The "Challenger" Expedition collected one hundred and two species or well-marked varieties of Compound Ascidians. These are described by Professor W. A. Herdman in vol. xiv. of the Zoological Reports of that cruise. Eighty-eight of the species and ten of the twenty-five genera are new, and two new families are established. The Compound Ascidians, like the simple ones, appear to attain their greatest numerical development in the southern temperate zone. Only twelve species were met with between one hundred and two hundred and fifty fathoms, seven reached to one thousand, and one strange form, *Pharyngodictyon mirabile*, was found at sixteen hundred fathoms. Section of the middle of the post-abdomen of an *Amaræcium* shows three empty cavities, the median one running the whole width of the post-abdomen, while the others, dorsal and ventral, are of irregular section. M. C. Maurice has proved that the median of these three tubes is a dependence of the branchial cavity (epicardium), while the others are prolongations of the pericardiac cavity. The genital organs of Amaræcium are placed in the post-abdomen on the same side of the epicardiac plate and on the dorsal aspect.

FISHES.—M. Yves Delage maintains, contrary to the opinion of Gunther, that the Leptocephala are normal larvæ, capable of transformation. So far from suffering through their distance from the coast, he believes that they finally reach it after having passed through their transformation. The pollack feeds upon these larvæ.

BIRDS.—Professor C. L. Herrick ("Bull. Sci. Lab. Denison Univ.") gives an account of the osteology of the Evening Grosbeak, *Hesperiphona vespertina* Bonap., and compares it with the Pipilo. The Evening Grosbeak seems to have its home in the Saskatchewan region, but visits Minneapolis frequently, and has been seen as far east as Cleveland, O. It is highly gregarious, and the migrating colonies keep up a constant chorus of piercing, but not unmelodious notes. They seem to feed almost entirely on the seeds of the box-elder, maple, poplar, pines, and some other trees. Their note is by no means confined to evening. Another species of the genus, *H. abeillii*, lives in the mountainous parts of Mexico.

The English quarterly journal of Ornithology entitled *The Ibis*, contains in its last issue a valuable article upon the wings of birds, by C. J. Sundeval, with a synopsis of the number of arm-remiges to be found in various species; some notes upon the genus Empidonax, by Mr. R. Ridgway, describing a new species and defining eighteen known species; two papers by Mr. R. B. Sharpe on birds from Fao, in the Persian Gulf, and others from Bushire, on the same gulf; and a list of the birds obtained by Mr. H. Whitely in British Guiana, as well as some shorter papers. The total number of birds on the Guiana list is six hundred and twenty-five, of which thirty-six are migratory or sea-birds. About sixty and one-half per cent. of the remaining five hundred and eighty-nine forms occur in the Amazons valley, twenty-seven and one-half per cent. in Venezuela, thirty-three per cent. in Columbia, thirty-six and one-half per cent. in Ecuador, forty-seven and one-half per cent. in Peru, thirty-three per cent. in Southeast and Central Brazil. The West Indies have but four per cent. of the birds of Guiana, or no more than are possessed by the Argentine Republic.

MAMMALIA.—The Central American Mammalia, dealt with by the late Mr. E. R. Alston, consist of one hundred and eighty-one species; Cetacea are not included in the work. Fifty-two of these species are bats, sixty rodents, and eleven quadrumana. The last are Neotropical forms that have penetrated northward. One only, *Ateles vellerosus*, has spread into Mexico to twenty-three degrees N. lat. The cats are southern or wide-spread, the dogs all northern. Seven out of the eight known Procyonidæ are found here, the exception being *Nasua rufa* of Brazil. Four species of Cariacus, the big-horn sheep, the prong-buck, two peccaries and two tapirs are the sole Ungulata. Among edentates three kinds of anteater, an armadillo, three sloths, and seven opossums extend beyond Panama.

EMBRYOLOGY.[1]

The Formation of the Eggs and Development of Rotifers.[2]—G. Tessin has made a very important contribution to the life-history of the wheel-animalcules, which he has traced in *Brachionus urceolaris*, *Euchlanis dilatata*, *Salpina mucronata*, and *Rotifer vulgaris*, having succeeded in obtaining satisfactory sections of the embryos in a number of stages.

The large simple sac opening into the cloaca, which has hitherto been regarded as the ovarium, is, according to Tessin, not an ovary at all, but the eggs are developed on the outside of this organ from a heap of cells lying on its right side and near its anterior end. As a rule, the number of nuclei in the ovarian mass is constant, eight nuclei being the usual number; only in the fixed Tubicolariæ, Philodinæ, and Pterodina could a larger or smaller number of ovarian nuclei be made out.

In the process of maturation the nucleus of the egg gradually passes to the periphery, where it breaks up; but before it does so a nuclear spindle is developed. This process Tessin regards as an indication that polar cells are extruded, although he did not actually succeed in finding them.

None of the accounts hitherto given of the manner of segmentation are correct, according to this author. The egg is first divided transversely into two unequal cells, the cleavage plane being also slightly oblique, and the larger cell anterior, the smaller

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[1] Edited by Dr. JOHN A. RYDER, Philadelphia.

[2] Ueber Eibildung und Entwickelung der Rotatorien, Zeitschr. f. Wiss. Zoologie, xliv., 1886, pp. 272–302, pls. xix., xx.